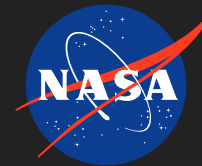


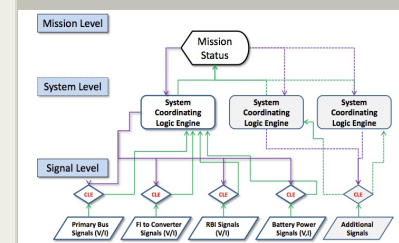
A Real-Time Fault Management Software System for Distributed Environments, Phase II

Completed Technology Project (2014 - 2016)



Project Introduction

Fault Management (FM) is critical to mission operations and particularly so for complex instruments – such as those used for aircraft and spacecraft. FM software and methodologies, however, too often have nagging limitations that restrict utility, and research and development continues to grapple relative to advancements in the complex systems they monitor. Modern spacecraft, for example, may have thousands of sensors and hundreds of systems/subsystems (and extensive cabling) but relatively few FM co-solutions. Theoretically, the overall FM challenge is in monitoring, modeling, and managing the huge numbers of signals and then determining how to detect them and set appropriate handling actions. For complex systems FM is not trivial, and automated FM is tasked with catching potential failure conditions within interconnected networks before consequences elevate. Ensuring fault coverage while maintaining system reliability under these circumstances is a daunting challenge for even the most capable team, and from anecdotal evidence, it is apparent that FM remains partly elusive. Our SBIR project herein involves the research and development of an innovative FM software solution called "DyMA-FM" (Dynamic Multivariate Assessment for Fault Management). As software, it uses model-based reasoning in a distributed processing environment for real-time detection and response to fault conditions. Building on the Phase I successes, in the course of this Phase II we will further develop the DyMA-FM concept as an innovative full prototype FM software application, having a tiered hierarchical architecture design leveraging advances in mathematical modeling. Thus, as per the intent of the Phase II, we believe we have a well-defined and innovative FM system capable of meeting the NASA requirements and representative thematic goals of: (1) verifiability, (2) transparency, and (3) fault coverage. Phase II, then, will allow us to advance the development further and fully.



A Real-Time Fault Management Software System for Distributed Environments, Phase II

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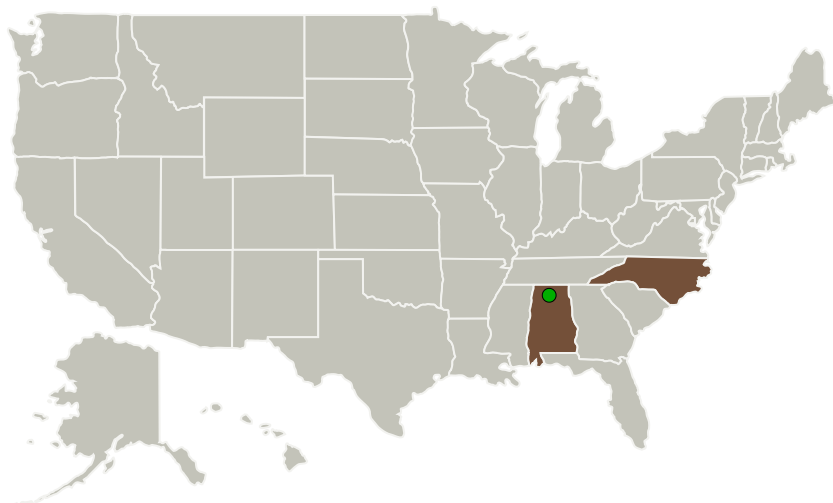
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
International Association of Virtual Organizations	Lead Organization	Industry	Durham, North Carolina
● Marshall Space Flight Center (MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations

Alabama	North Carolina
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Project Transitions

▶ **April 2014:** Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

International Association of Virtual Organizations

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

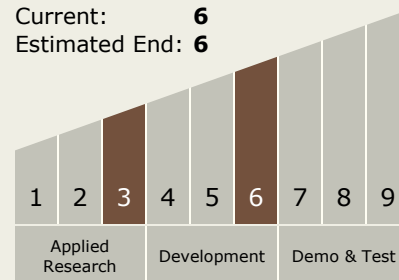
Carlos Torrez

Principal Investigator:

Brad Grinstead

Technology Maturity (TRL)

Start: **3**
 Current: **6**
 Estimated End: **6**



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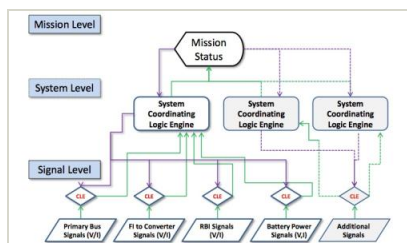
✓ **April 2016:** Closed out

Closeout Summary: A Real-Time Fault Management Software System for Distributed Environments, Phase II Project Image

Closeout Documentation:

- Final Summary Chart Image(<https://techport.nasa.gov/file/137628>)

Images



Briefing Chart Image

A Real-Time Fault Management Software System for Distributed Environments, Phase II

(<https://techport.nasa.gov/image/136635>)

Technology Areas

Primary:

- TX10 Autonomous Systems
 - TX10.2 Reasoning and Acting
 - TX10.2.3 Motion Planning

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System